SP10 Electricity and Circuits

SP10a Electric circuits

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
| D:\WD\Live Job\2016\Sep-16\regcsesciencewordformattingsb3sc13sp4andsp5\Required_Input\Required_Input\TTPP progression steps icons\Progression_icon_L7.jpg | Describe the basic structure of an atom (positions, relative masses and relative charges of protons, neutrons and electrons). |  |  |  |
| D:\WD\Live Job\2016\Sep-16\regcsesciencewordformattingsb3sc13sp4andsp5\Required_Input\Required_Input\TTPP progression steps icons\Progression_icon_L3.jpg | Recognise the circuit symbols for a range of common electrical components (cells, including batteries, switches, voltmeters, ammeters and lamps). |  |  |  |
|  | Draw diagrams for circuits containing common electrical components, using conventions for positive and negative terminals. |  |  |  |
|  | Describe and explain the difference between the brightness of identical lamps in series and parallel circuits. |  |  |  |
|  | Describe and explain the effects of different numbers of identical lamps, cells and switches in series and parallel circuits. |  |  |  |

SP10b Current and potential difference

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | Describe how to measure voltage. |  |  |  |
|  | Define the term ‘potential difference’. |  |  |  |
|  | Describe how to measure current. |  |  |  |
|  | Describe the conditions needed to produce an electric current. (A complete circuit and a source of voltage/potential difference.) |  |  |  |
|  | Describe the behaviour of current at a junction. |  |  |  |

SP10c Current, charge and energy

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | Explain the link between the potential difference (voltage) across a battery or a component, the charge passing through it and the amount of energy transferred. |  |  |  |
|  | Recall that the unit of potential difference is the volt and explain it in terms of units of energy and charge (a potential difference of one joule per coulomb). |  |  |  |
|  | Recall and use the equation to calculate the energy transferred, the charge that flows or the potential difference. (*E* = *Q* × *V*) |  |  |  |
|  | Explain the link between electric current and electric charge. |  |  |  |
|  | Explain electric current in metals in terms of electrons. |  |  |  |
| D:\WD\Live Job\2016\Sep-16\regcsesciencewordformattingsb3sc13sp4andsp5\Required_Input\Required_Input\TTPP progression steps icons\Progression_icon_L7.jpg | Recall and use the equation to calculate the charge that flows, the current or the time the current flows. (*Q* = *I* × *t* ) |  |  |  |

SP10d Resistance

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | Explain the link between resistance and current in a circuit. |  |  |  |
|  | Define the resistance of a component or circuit (*R* = *V/I*). |  |  |  |
|  | Recall and use the equation to calculate the potential difference, the current or the resistance (*V* = *I* × *R*). |  |  |  |
|  | Explain the difference in resistance when two resistors are connected in series or in parallel. |  |  |  |
|  | Calculate the currents, potential differences and resistances in series circuits. |  |  |  |
|  | Explain the design and construction of series circuits for testing and measuring. |  |  |  |

SP10e More about resistance

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | Explain how current changes with potential difference in fixed resistors. |  |  |  |
|  | Explain how current and resistance change with potential difference in filament lamps. |  |  |  |
|  | Explain how current and resistance change with potential difference in diodes, including light-emitting diodes (LEDs). |  |  |  |
|  | Describe how the resistance of a light-dependent resistor (LDR) varies with changing light intensity. |  |  |  |
|  | Describe how the resistance of a thermistor varies with changing temperature. (negative temperature coefficient only) |  |  |  |
|  | Describe the uses of diodes, LDRs and thermistors. |  |  |  |

SP10f Transferring energy

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | Describe the energy transfer that occurs when a current passes through a resistor. |  |  |  |
|  | Use the electron and ion model and the idea of electrical work to explain the energy transfer in a resistor and the resulting dissipation of energy in the surroundings. |  |  |  |
|  | H Explain how unwanted energy transfers in wires can be avoided. |  |  |  |
|  | Recall the advantages of the heating effect of an electric current. |  |  |  |
|  | Recall the disadvantages of the heating effect of an electric current. |  |  |  |
|  | Use the equation *E* = *I* × *V* × *t* to calculate the energy transferred, the current, the potential difference or the time. |  |  |  |

SP10g Power

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | Define power and the units used to measure it. (energy transferred per second in watts) |  |  |  |
|  | Recall and use the equation to calculate the power, the energy transferred or the time taken. (*P* = *E*/*t*) |  |  |  |
|  | Explain how power transfer depends on the potential difference across a device and the current through it. |  |  |  |
|  | Recall and use the equation to calculate the electrical power, the current or the potential difference. (*P* = *I* × *V*) |  |  |  |
|  | Recall and use the equation to calculate the electrical power, the current or the resistance. (*P* = *I*2 × *R*) |  |  |  |

SP10h Transferring energy by electricity

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | Describe energy transfers from d.c. batteries and the a.c. mains supply to motors and heaters. |  |  |  |
|  | Explain the difference between direct and alternating voltage. |  |  |  |
|  | Compare alternating and direct current (in terms of movement of charge). |  |  |  |
|  | Recall the frequency and voltage of the UK domestic supply. |  |  |  |
|  | Describe the power ratings of some domestic electrical appliances and changes in stored energy when they are in use. |  |  |  |

SP10i Electrical safety

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | Explain the difference between the functions of the live and the neutral wires. |  |  |  |
|  | Explain how circuit breakers make circuits safer. |  |  |  |
|  | Explain how the earth wire and the fuse make circuits safer. |  |  |  |
|  | Explain why switches and fuses are connected in the live wire. |  |  |  |
|  | Recall the potential differences between the live, neutral and earth wires. |  |  |  |
|  | Explain the danger of a connection between the live wire and earth. |  |  |  |